



*True Color Sensor*

**SMARTEYE®**  
**COLORWise™**  
**TRUE COLOR SENSOR**

# SMARTEYE® COLORWISE™ TRUE COLOR SENSOR

The **SMARTEYE® COLORWISE™ True Color Sensor** is the most feature packed color sensor available. Designed to work as well as an instrument or spectrometer, this sensor can solve the most difficult color applications at higher speeds than color cameras or the closest priced competitive product. The 4 Channel Monitor provides a visual confirmation of performance without having to switch channel selections or touch the sensor in any way. Providing a choice in speed versus resolution, the **SMARTEYE® COLORWISE™** puts the controls of the performance of the sensor in the hands of the operator; allowing for more application solutions, and removing the limits that either speed or resolution alone can offer.

With control over Tolerance, Light Intensity, Output Configuration (NPN or PNP), Timers, Input Configuration (Edge or Gate), the **SMARTEYE® COLORWISE™** provides a tailored and customized solution for the most difficult color sorting, or inspection problems facing today's packaging and production lines. The **SMARTEYE® COLORWISE™** also comes equipped with 4 digital and 3 analog outputs that not only help to sort products by color, but can determine specific color signatures as well.

The **SMARTEYE® COLORWISE™ True Color Sensor** from Tri-Tronics®:

***The Wisest choice you can make!***



## Features

- n 4-Digital Outputs (NPN or PNP)
- n 4-Channel Monitor for at-a-glance performance evaluation
- n 3-Analog Outputs (XYZ or xyY); 0 to 5 VDC
- n Adjustable Tolerance for each channel
- n Adjustable Timers for each channel: One Shot; On Delay; Off Delay; Latch
- n 14-Pin 6" pigtail 1/4-turn locking connector or cable version
- n Adjustable LED light intensity
- n Select high speed versus high resolution (CW-1 model only)
- n Short range and long range models available
- n Remote Color Capture
- n Button Lockout

## Benefits

- n Flexible and convertible for many different color applications
- n Useful for color sorting and color verification applications all in one sensor
- n No-touch setup via remote color capture wire (selectable input; NPN/Negative or PNP/Positive)
- n Reduce cost and speed constraints of color cameras or spectrometers
- n Quick digital changeover
- n Tamperproof with button lockout feature

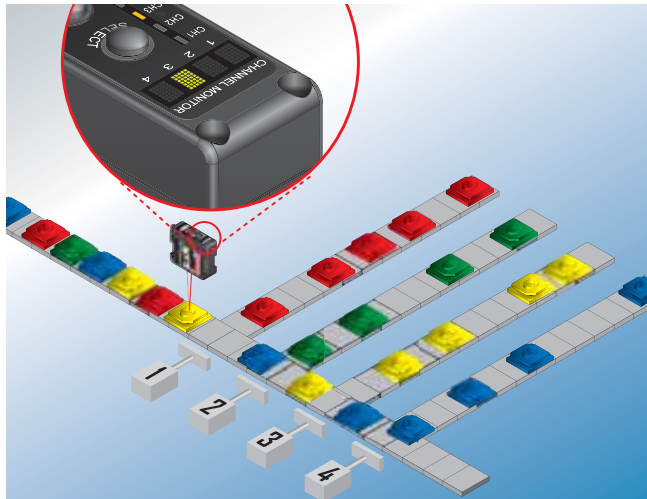
## Applications

- n Automotive - Trim Color Assembly, Carpet and Mat matching, Paint Verification
- n Textile - Color Verification, Die Quality Control
- n Bottle Industry - Color Sorting, Color Verification, Quality Inspection
- n Food Industry - Cooking Time Control, Quality Inspection/Control
- n Graphic Art - Color Verification, Quality Control, Missing Color Detection

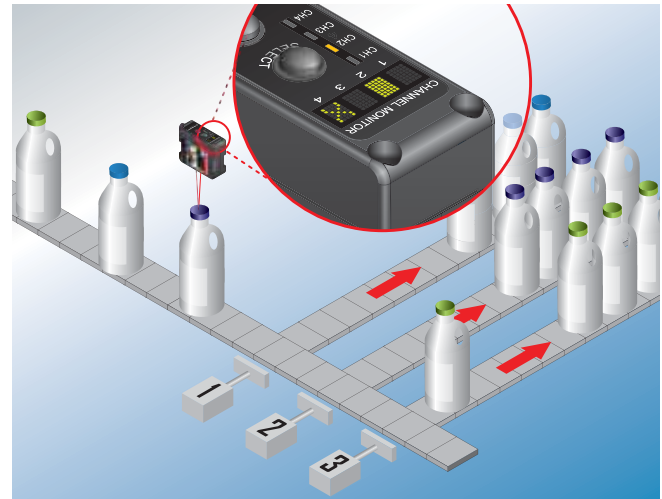
# Applications

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## Color Sorting

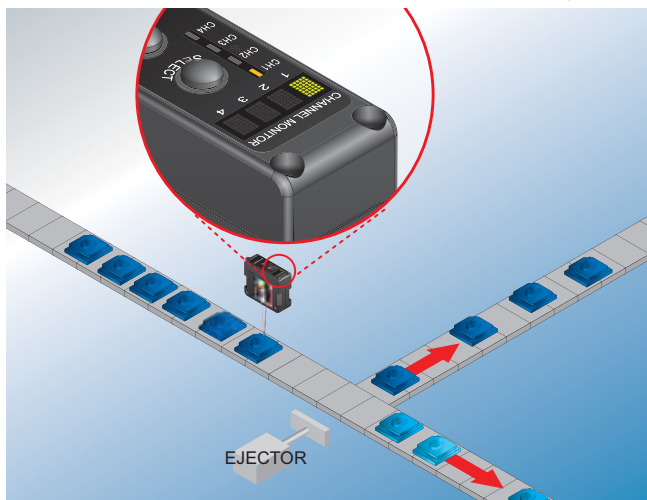


Sort items by color.

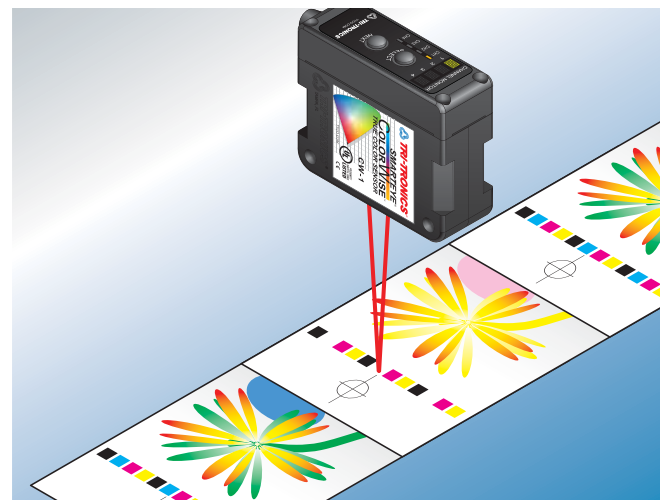


Separate grouped items by color.

## Color Verification for Quality Inspection



Verify proper shade of color.



Inspect for missing colors.

## Color Process Control



Guarantee uniform cooking for efficient process.



Control energy usage via color process control.



# Features

## Color Capture (CAPT)

Setup on target color with a simple push of a button. Four individual digital channels.

## Four Channel Color Monitor (CH-X)

At-a-glance visual confirmation of real time performance for all four channels. Bargraph indicates quality of color match on each channel.

## Tolerance Adjustment

Precise adjustment of tolerance levels for each of the four channels provides a wide range of resolution capabilities.

## Color (C) or Color + Intensity (CI)

The ability to select between Color and Color + Intensity provides the ability to differentiate between slight color differences, or shade-to-shade changes.

## Output Mode

Select LO for output ON for a color match; DO for output OFF for no color match; and MUTE to de-select channel monitor and disable output.

## Speed versus Resolution

Select Uspd - Ultra High Speed (75µs); HSpd - High Speed (150µs); or HRes -High Resolution (300µs).

*Note: This feature available on CW-1 models only.*

## Light Intensity

Adjust Light Intensity (L100) in System Parameter from L10, dimmest to L100, brightest. Useful when mechanical restrictions limit sensor position or distance.

## Timer

Timer available for each of the four channels:

Toff = No Timer; OffD = Off Delay; OnD = On Delay; Shot = One Shot; Latch = Latch. Adjustable from 1ms to 9999ms.

## Remote Capture

Pulse the Remote Capture wire to Negative or Positive, dependent upon the IN> setting, NPN or PNP, respectively.

*Note: Each pulse on for 40ms to 400ms. The time between pulses is 40ms to 400ms.*

## Signal Strength Monitor

Displays the total signal strength as a number from 0 (low) to 100 (high). This feature is useful in determining when too much or too little light is being received. Useful for setup in determining sensor position.

## Input (Gate or Edge)

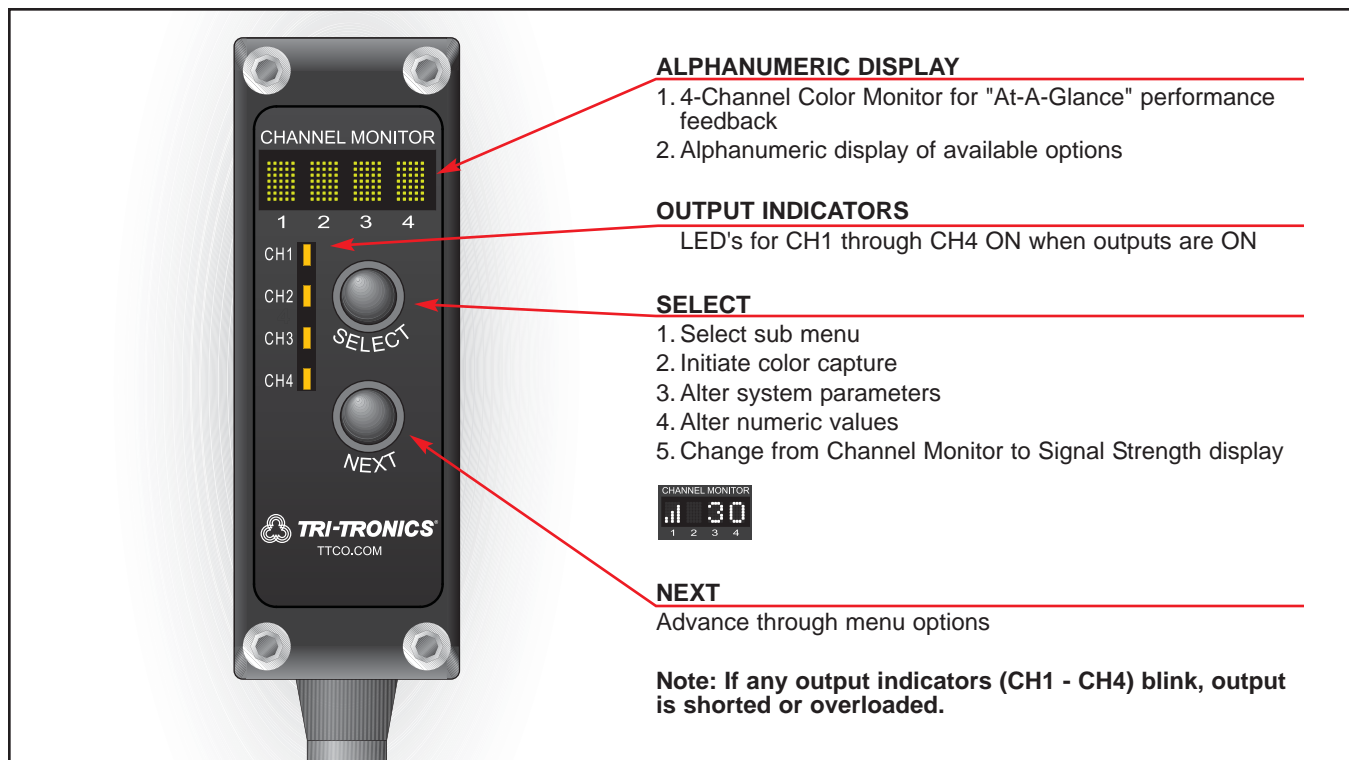
Provides a window of time to detect/capture the target color, allowing for inspection of color at the proper space and time during continuous product flow and normal production line speeds.

## Connections

Available with standard 6', 14 wire cable; or optional 6" pigtail, 14 pin, 1/4-turn locking connector. Mating cable model #BCC-6.

## Mounting Options

Through-hole or available bracket mounting.



# Special Features



## Analog XYZ and xyY

The ColorWise has three analog output wires that operate together in one of two modes, XYZ or xyY as set in the System Parameters menu. In the XYZ mode, the sensor provides an RGB type output. The X, Y and Z output wires represent the intensity of the red, green and blue components of the target color as a 0- 5 VDC signal. In the xyY mode, the sensor provides an output that separates color from intensity. The x and y signals act as (x,y) coordinates to give an indication of color while the magnitude of the Y signal gives an indication of signal intensity or color brightness. Output signals in xyY mode are also given as 0-5 VDC on each wire.

The ColorWise analog outputs can easily be evaluated by a PLC for use in process control, inspection, sorting and other applications.

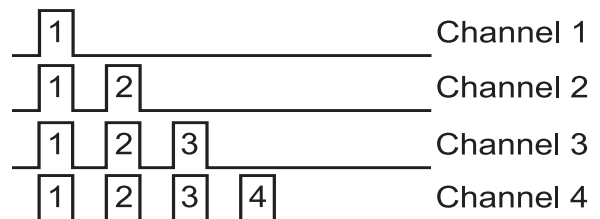
For more information on the XYZ and xyY Color Space and definitions, go to:

[http://www.optics.arizona.edu/opti588/reading/CIE\\_color\\_space.pdf](http://www.optics.arizona.edu/opti588/reading/CIE_color_space.pdf)

## Remote Capture

Pulse the Remote Capture wire to Negative or Positive, dependent upon IN> setting; NPN or PNP, respectively.

*NOTE: Each pulse on for 40ms to 400ms. The idle time between pulses is 40ms to 400ms*

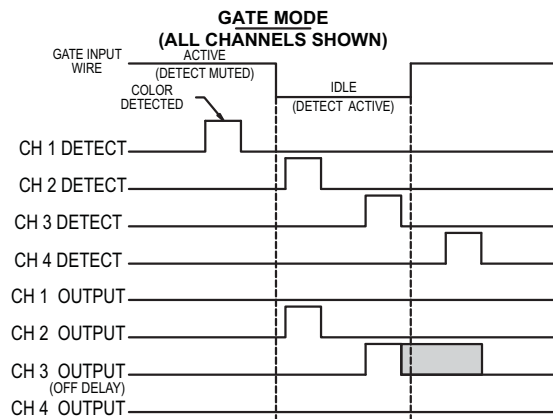


## Gate Input

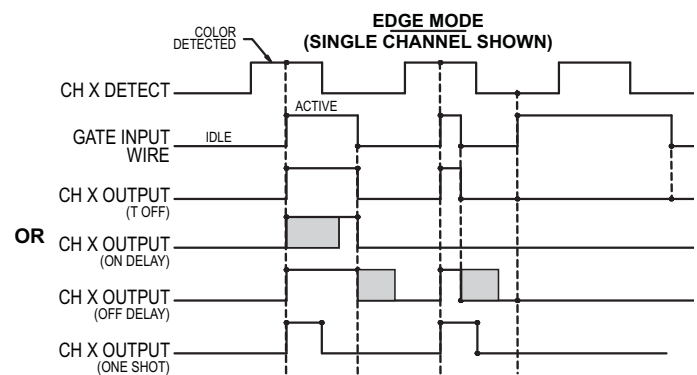
The Gate Input Wire can be used with or without the Latch Timer function. Useful for resetting the latch, gating or triggering the sensor at a specific time and location on the target, and for “windowing” the sensor to ignore other targets or objects that may come into view which should be ignored. The Input can be configured for either an NPN/Negative, or a PNP/Positive signal.

### GATE INPUT FUNCTIONALITY - LATCH DISABLED

GATE MODE OR EDGE MODE SET IN SYSTEM MENU



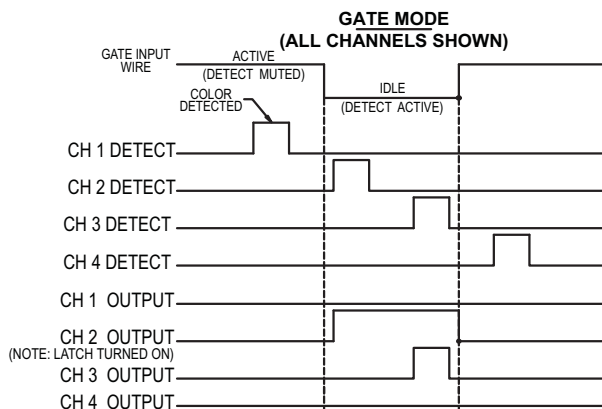
NOTE: Output can extend beyond idle to active transition for off-delay & one shot.



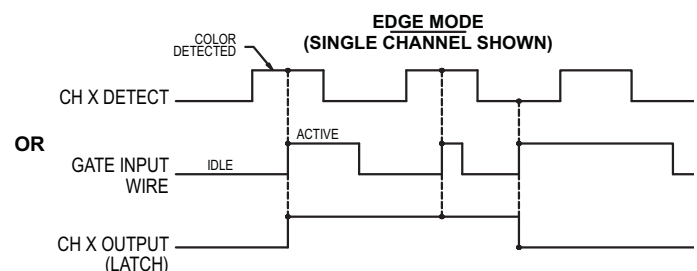
NOTE: DEFAULT STATE OF LINE IS RELEASE (OUTPUTS ARE ACTIVE)  
NOTE: IN EDGE MODE: 1. SAMPLE ON GATE INPUT TRANSITION TO ACTIVE  
2. RESET OUTPUT ON GATE INPUT TRANSITION TO IDLE

### GATE INPUT FUNCTIONALITY - LATCH ENABLED

GATE MODE OR EDGE MODE SET IN SYSTEM MENU



(NOTE: LATCH TURNED ON)



NOTE: DEFAULT STATE OF LINE IS RELEASE (OUTPUTS ARE ACTIVE)

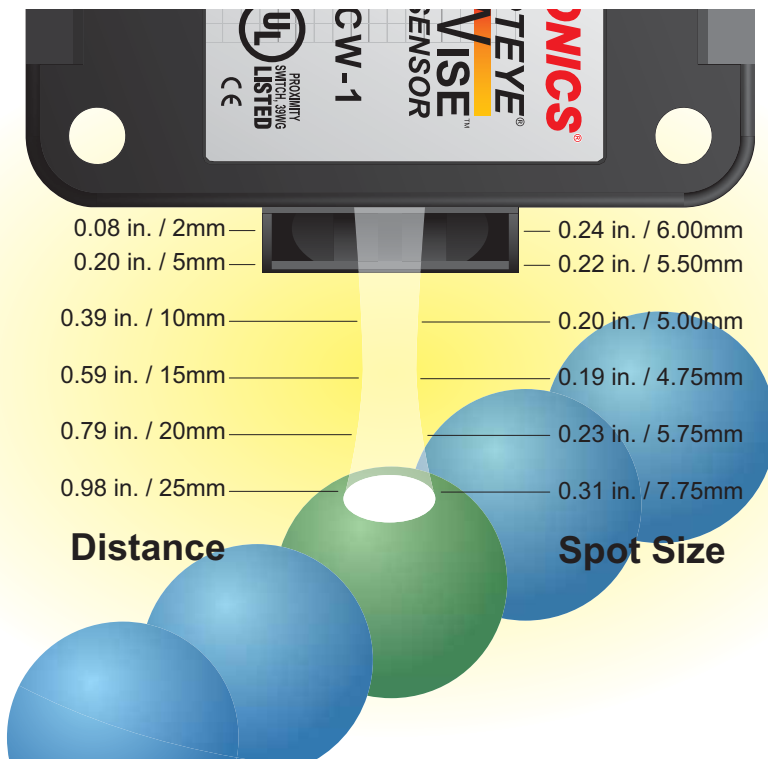
# ColorWise Range Guideline

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## Short Range Guideline (CW-1)

The short range version is useful when the color is consistent across the entire product: when product is small; when the target is a color registration mark; or when the target is a specific color on a label. Applications that may be solved with the short range models are cap color, registration marks, label orientation, pharmaceutical color coding, tote sorting, etc.

The short range version allows for a selection of speed versus resolution to resolve high speed color applications as well as low levels of color shade changes.



## Long Range Guideline (CW-2)

The long range models should be used when distance to the target exceeds the range of the short range model, the physical or mechanical constraints require a longer range, or the product needs a larger spot of light for averaging, as in applications such as textile, food, or grainy products or surfaces.

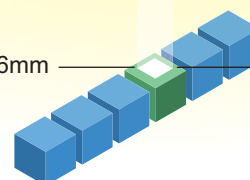
The long range model provides a wide range of focal distances, with a large beam to view over surfaces that require more color averaging over many different substrate surface textures.



### Distance

### Spot Size

2 in. / 51mm	0.75 in. / 19mm
6 in. / 152mm	1.25 in. / 32mm
10 in. / 254mm	1.625 in. / 41mm
12 in. / 305mm	1.875 in. / 48mm
16 in. / 406mm	2.375 in. / 60mm



# How to Specify

**SMARTEYE®**  
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- 1. Select Sensor:**  
SMARTEYE® ColorWise™ True Color Sensor
- 2. Select Cable:**  
Blank = 6 foot (1.8m), 14 conductor, 28AWG Cable  
C = 6 inch (152mm) pigtail with 14-pin, 1/4-turn locking connector
- 3. Select Model:**  
-1 = Short Range  
-2 = Long Range
- 4. Select Lens Material:**  
Blank = Acrylic  
G = Glass

## Example:

**CW C -1 G**

SMARTEYE® ColorWise™ True Color Sensor

Blank = 6' Cable (1.8m)  
C = 14-Pin Pigtail Connector 6" (152mm)

Model Type  
-1 = Short Range  
-2 = Long Range

Lens Material  
Blank = Acrylic  
G = Glass

## Hardware & Accessories

### Extension Cable and Bracket Selection Guide

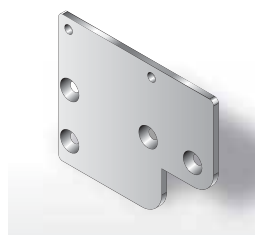
XMB-1L  
Left-hand Universal Mounting Bracket

XMB-1R  
Right-hand Universal Mounting Bracket

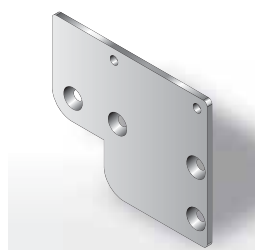
XMB-2  
Front-mount Mounting Bracket

SEB-4  
Stainless Steel Vertical Mounting Bracket

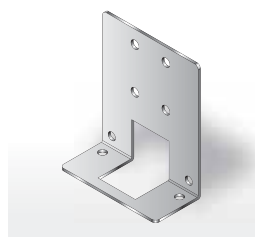
BCC-6  
6-ft. (1.8m), 14-pin, twist-lock Connector Cable



**XMB-1L**  
Left



**XMB-1R**  
Right



**XMB-2**  
Front Mount



**SEB-4**  
Stainless Steel  
Mounting Bracket



**BCC-6**  
Sensor Cable, 6 foot. (1.8m)



# Specifications

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## SUPPLY VOLTAGE

- 12 to 24 VDC
- Polarity Protected
- Intended for use in Class 2 circuits

## CURRENT REQUIREMENTS

- CW-1: 110mA@12VDC, 80mA@24VDC
- CW-2: 140mA@12VDC, 85mA@24VDC

## PERFORMANCE

- CW-1: Effective Resolution: Min. 12 bit, Max. 16 bit
- CW-2: Effective Resolution: 14 bit

## OPTICAL CHARACTERISTICS

- Light emitter: White LED
- Optical axis: CW-1: Coaxial; CW-2: Convergent
- Receiving spectrum: 400nm to 700nm

## DIGITAL OUTPUTS

- Four (4) selectable NPN or PNP open collector outputs
- 75mA capacity
- Short circuit & transient voltage protected
- Residual voltage: NPN, 1.35 max.; PNP, 2.05 max.

## ANALOG OUTPUTS

- Three outputs: Selectable as XYZ for color differentiation (RGB equivalent) or xyY for color + intensity differentiation
- 0-5 VDC +/-1%
- 10 bit resolution
- Max load per channel: 2k OHMS
- Transient Suppression

## OUTPUT SELECTION

- LO (Light On or Color Match)
- DO (Dark On or No-Match)
- Mute (Channel Off)

## REMOTE CAPTURE INPUT

- Input time: 25ms (ON) / 25ms (OFF) minimum
- Selectable (sinking or sourcing)
- Contact or solid-state input 1mA
- Transient suppression

## GATE INPUT

- Selectable NPN/Sinking or PNP/Sourcing
- Selectable EDGE or GATE trigger for latch reset or inhibit for windowing
- Contact or solid-state input 1mA
- Transient suppression

## TIMER

- On delay, off delay, one shot, and latch
- Duration: 1mS to 10 seconds +/-1%

## DETECTION MODE

- Color or color + intensity

## ALPHANUMERIC DISPLAY

- 4-Channel Color Monitor for "At-A-Glance" Performance Feedback
- Alphanumeric Display for Available Options

## RESPONSE TIME

- Color-to-color: CW-1: 75µs (Uspd), 150µs (Hspd), and 300µs (Hres); CW-2: 600µs
- Shade-to-shade: CW-1: 100µs (Uspd), 200µs (Hspd), and 800µs (Hres); CW-2: 800µs

## DIAGNOSTIC INDICATORS

- Output Indicator – (Amber) CH 1 through CH 4
- Four Character Alphanumeric Display – (Green)

## AMBIENT LIGHT IMMUNITY

- Responds to sensor's pulsed modulated light source – immune to most ambient light including indirect sunlight

## HUMAN INTERFACE

- Pushbutton control: Select, Next

## AMBIENT TEMPERATURE

- -5°C to 55°C (23°F to 131°F)
- No ice, frost, or fogging allowed

## STORAGE TEMPERATURE

- 5°C to 90°C (41°F to 104°F)

## RELATIVE HUMIDITY

- 35% to 85%

## VIBRATION

- 10 to 55 Hz, 0.5mm, 30 minutes each axis

## SHOCK

- Half-sine wave, 30g, 1µs 6 times 3 axis

## CERTIFICATIONS

- CE - Complies with IEC 60947-5-2 edition 3.0 2007-10
- UL & CUL listed; CCN NRKH & NRKH7

## LENS MATERIAL

- Acrylic or glass

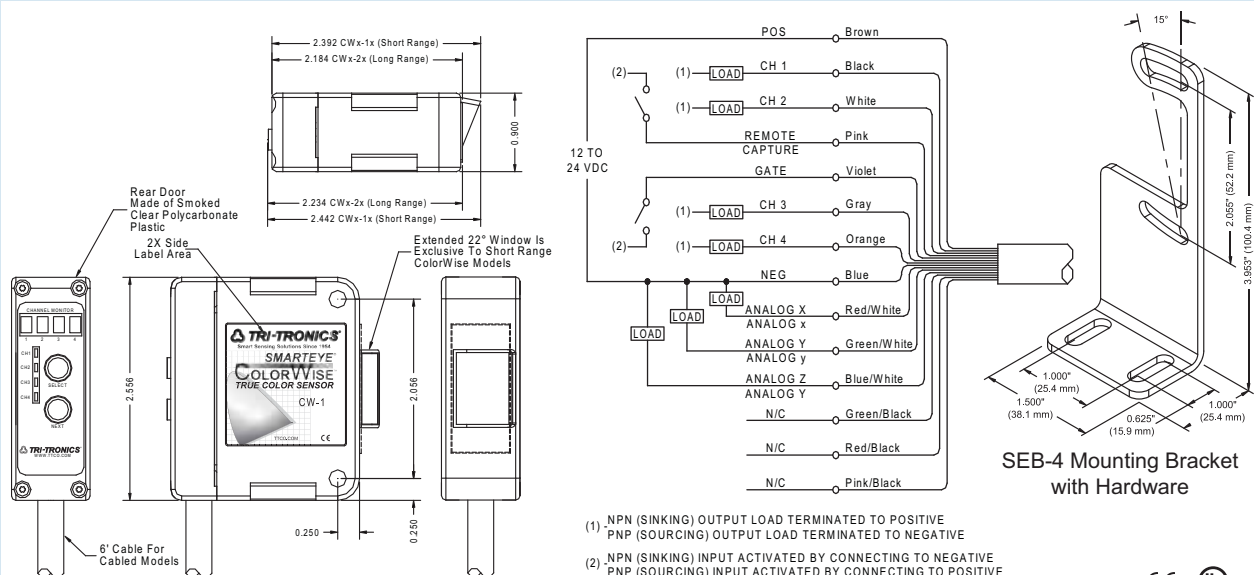
## RUGGED CONSTRUCTION

- Chemical resistant, high impact polycarbonate housing
- Waterproof ratings: NEMA 4, IP65.

RoHS Compliant  
Product subject to change without notice

## Connections and Dimensions

## SMARTEYE® ColorWise™



- (1) NPN (SINKING) OUTPUT LOAD TERMINATED TO POSITIVE  
PNP (SOURCING) OUTPUT LOAD TERMINATED TO NEGATIVE
- (2) NPN (SINKING) INPUT ACTIVATED BY CONNECTING TO NEGATIVE  
PNP (SOURCING) INPUT ACTIVATED BY CONNECTING TO POSITIVE

For connector models use:  
BCC-6 - 6 ft. 14 Wire Cable with ¼ Turn Locking Connector

